PROTECTION OF STRATOSPHERIC OZONE: PROCESS FOR EXEMPTING CRITICAL USES FROM THE PHASEOUT OF METHYL BROMIDE

TECHNICAL DOCUMENT DESCRIBING EPA's METHODOLOGY FOR IDENTIFYING AVAILABLE STOCKS OF METHYL BROMIDE

Redacted Text Version To Protect Information Claimed As Confidential Business Information

The text of the report has been redacted to protect information claimed as confidential business information (CBI) and information that would allow calculation of CBI.

SECTION I. Background on Proposed Action

In accordance with the Clean Air Act and Montreal Protocol, EPA is proposing to issue critical use allowances to methyl bromide producers and importers for the continued production and import of methyl bromide to satisfy particular critical uses after the phaseout of the ozone depleting substance takes effect on January 1, 2005.

In accordance with these authorities, EPA is also proposing a limit on the sale of stocks of methyl bromide to critical use categories. This action proposes that holders of inventories will be authorized to sell methyl bromide for critical use by expending critical stock allowances that would be allocated by EPA through this rulemaking action.

In order to implement its proposed action and identify the amount of critical use and critical stock allowances to be issued, EPA needs to identify the amount of methyl bromide stocks that exist in the United States and are available for approved critical uses in the United States. This Technical Document describes the methodology, data sources, and assumptions that EPA has used to identify a range of Available Stocks of methyl bromide for the year 2005. For future years, EPA is also proposing annual reporting requirements that will provide the Agency with sufficient information to determine the existing and available stocks for the upcoming year.

The remainder of this Technical Document is organized as follows:

- Section II summarizes the methodology that EPA is proposing to use to estimate the amount of methyl bromide stocks available for critical uses and describes the factors that are considered in this approach;

- Sections III describes the proposed methodology in more detail and identifies data sources used to quantify each of the factors considered in this methodology; and

- Section IV summarizes the foregoing analysis and tabulates the range of stocks estimated to be available for critical uses in 2005.

SECTION II. Summary of Methodology for Identifying Available Stocks (AS)

A. Overview of Factors Used to Identify Available Stocks:

The top-down methodology (described below) that EPA proposes to use for identifying available stocks, can be represented by the following formula (although it is not purely a quantitative exercise):

AS = (ES + B) - E1 - E2 - C - N - D

Where:

- AS = available stocks;
- ES = existing unrestricted stocks as of the end of calendar year 2003;
- B = banked stocks of critical use methyl bromide;
- E1 = amount held for export to developing countries, but not produced with Article 5 allowances;
- E2 = amount held for export to developed countries and for critical use by the U.S.;
- C = amount held in catastrophic reserve;
- N = amount held for transition management in non-critical use categories in 2005, and;
- D = the estimated drawdown of stocks by U.S. consumers in 2004.

B. Existing Stocks (ES) + Banked Stocks (B)

Existing Stocks (ES) are defined as the unrestricted total stocks of methyl bromide held in the United States by producers, importers, distributors; and applicants as of the end of calendar year 2003. Existing Stocks do not include restricted stocks of methyl bromide that were produced under the exemptions for quarantine and preshipment (QPS) and to meet the basic domestic needs of Parties to the Montreal Protocol operating under Article 5, Paragraph 1, of the Protocol (Article 5 countries). In future years, Existing Stocks would be supplemented with Banked Stocks (B) of methyl bromide that were produced or imported with expended critical use allowances in a given year and that were unused during that year. At the beginning of 2005, the value for Banked Stocks (B) will be zero. The factors Existing Stocks (ES) and Banked Stocks (B) are described in further detail in Section III.A

C. Exports to Developing Countries (E1)

Exports to Developing Countries (E1) is defined as exports of methyl bromide from the U.S. to Article 5 countries. The estimate of Exports to Developing Countries is based on the newly calculated U.S. baseline to meet the basic domestic needs of developing countries (Article 5 countries) in accordance with the Beijing Amendments to the Protocol. The EPA is in the process of adjusting the allocation of Article 5 allowances to U.S. manufacturers of methyl bromide to reflect the Beijing Amendments. The new baseline for methyl bromide to meet the basic domestic needs of Article 5 countries under the Beijing Amendments will be the average amount exported to Article 5(1) countries from 1995-1998, and then in 2005 it will be 80 percent of this amount. EPA believes that demand for methyl bromide in Article 5 countries will exceed the new baseline for 2005 and will be satisfied from existing stocks of methyl bromide in the U.S. Thus, this factors (E1) is projected to be the difference between this new baseline and actual 2003 U.S. exports to Article 5 developing countries. The basis for this estimate is described in Section III.B.

D. Exports to Developed Countries (E2)

Exports to Developed Countries (E2) is based on an assumption that a portion of the U.S. inventory will need to be “filled in” at the beginning of the 2005 control period (calendar year) while the non-Article 5 countries that are authorized for critical use exemptions overcome “start-up challenges” in initiating their critical use exemption procedures. The assessment is based on exports of methyl bromide from the U.S. to countries not operating under Article 5 (paragraph 1) of the Montreal Protocol (non-Article 5 countries) as well as the amount authorized for U.S. for critical use exemptions in 2005. The estimate of the amount of Exports to Developed Countries is based on the 2005 critical use exemptions approved (in Decision Ex I/3) and an estimate that **[…redacted to protect claimed confidential business information (CBI)…]** percent of this amount would need to be met from inventories to overcome timing and start-up challenges in the U.S. and/or in other non-Article 5 countries at the beginning of 2005 with regard to implementation of critical use exemption procedures. The basis for this estimate is described in Section III.C.

E. Catastrophic Reserve (C)

Catastrophic Reserve (C) is defined as the amount of methyl bromide physically manufactured in the United States for all uses, including both domestic and overseas markets for transformation (feedstock), quarantine and preshipment, exports to Article 5 countries, and critical uses, over a period of just over three months, i.e., 100 days.

This Catastrophic Reserve is a factor in the methodology because the U.S. is the world’s largest supplier of methyl bromide, and because there are currently a small number of plants in the U.S. manufacturing or capable of manufacturing methyl bromide. In the event of an unforeseen catastrophe, such as the temporary or permanent failure of a methyl bromide plant, it is believed that a methyl bromide reserve should be accessible in order to meet real time global demand for methyl bromide during such time as methyl bromide manufacturing is interrupted. It is estimated that a catastrophic incident that resulted in unforseen interruption in methyl bromide manufacturing in the U.S. could interrupt manufacturing for just over three months. The basis for the Catastrophic Reserve estimate is described in Section III.D.

F. Non-CUE Sectors (N)

Non-CUE Sectors (N) is defined as the amount of methyl bromide inventory that may be required for transition management in non-critical use categories for use in 2005. Entities in (N) are those that did not apply for a CUE for 2005 because they intend to temporarily meet their small, limited needs for methyl bromide by accessing existing U.S. inventories of methyl bromide as they transition to alternatives. Therefore EPA proposes to deduct from the existing stockpile the amount of methyl bromide (N) for 2005 that will be needed by end users who did not apply for an exemption but who anticipated using methyl bromide during their short-term transition to alternatives. The basis for the Non-CUE Sector estimate is described in Section III.E.

G. Drawdown Estimate (D)

The estimated drawdown (D) is defined as the amount of methyl bromide that will come from existing stocks that will be sold to (or contracted for) all uses during 2004 before the phaseout begins. The basis for the Drawdown estimate is described in Section III.F.

SECTION III. Elaboration of Factors in Methodology

A. Existing Stocks (ES) + Banked Stocks (B)

Existing Stocks (ES) are defined as the unrestricted total stocks of methyl bromide held for sale and for transfer to another entity by entities in the United States that produce, import, distribute, sell, apply, or buy methyl bromide material. Existing Stocks do not include restricted stocks of methyl bromide that were produced under the exemptions for quarantine and preshipment and for meeting basic domestic needs of Article 5 countries produced or imported with Article 5 allowances. The calculation of Existing Stocks is based on data reported to EPA by manufacturers, importers and national distributors of methyl bromide. Companies were asked to report existing stocks of methyl bromide as of December 31, 2002. These same companies were asked to report on existing stocks of methyl bromide as of December 31, 2003. The 2003 Existing Stocks value is the amount of stocks reported to EPA as of December 31, 2003. As noted in the proposed rule EPA is publishing concurrently with the rule a notice seeking to update information on existing, unrestricted inventories in the United States through a request under authority of Section 114 of the Clean Air Act. For the purposes of the proposed rule and the methodology described for identifying available stocks, the amount of Existing Stock is equal to the amount held by and reported to EPA by the producers, importers and national distributors as of December 31, 2003, the most recent data available to EPA at the time of publication of the rule. Stock (B) will be zero during 2004 because methyl bromide will not have been produced under critical use exemptions (i.e., methyl bromide that was produced or imported with expended critical use allowances in a given year and that was unused during that year). So in 2004, the factor Banked Stock (B) will be zero in assessing the quantity of available stocks for the 2005 calendar year (control period).

Existing Stocks were determined through data collected from methyl bromide manufacturers and users and from national, but not regional, methyl bromide distributors.

Table III-1: Existing Stocks for End of Calendar-Year 2003 (in metric tons)

Date	Existing Stocks
December 31, 2003	**[redacted]**

Source: EPA survey of methyl bromide manufacturers, users, and distributors.

B. Exports to Developing Countries (E1)

Exports to Developing Countries (E1) is defined as exports of methyl bromide from the U.S. to Article 5 countries. Section 604 of the Clean Air Act allows U.S. methyl bromide producers to produce limited quantities of methyl bromide for export to Article 5 countries. To meet developing countries' basic domestic needs between January 1, 2005 and January 1, 2015, Article 2H(5*bis*) of the Montreal Protocol states that each Party may produce up to 80 percent of its 1995-1998 baseline production. To establish this limit of 80 percent of the baseline that can be produced to meet the basic domestic of Article 5 countries in 2005, EPA allocates Article 5 Allowances to manufacturers of methyl bromide.

The estimate of Exports to Developing Countries is based on the newly calculated U.S. baseline to meet the basic domestic needs of Article 5 countries in accordance with the Beijing Amendments to the Protocol. To meet these needs, the new baseline will be the average amount exported from 1995-1998 to Article 5 countries, and in 2005, it will be 80 percent of this amount. EPA believes that demand for methyl bromide in Article 5 developing countries above and beyond the amount that can be produced with Article 5 allowances will be satisfied from existing stocks of methyl bromide.   Thus, this factor (E1) is projected to be the difference between this new baseline of Article 5 allowances for 2005 and the actual 2003 U.S. exports to Article 5 developing countries. It is assumed that the amount of methyl bromide exported to Article 5 countries through new 2005 production expending Article 5 allowances will not meet all the demand of historical customers in Article 5 countries and the difference in U.S. exports above and beyond the A5 allowance level would be met by drawing from existing U.S. stocks.

Actual U.S. exports of methyl bromide to developing countries in 2003 were calculated from the U.S. EPA Ozone-depleting Substance Tracking System. Total exports to developing countries in 2003 were calculated by summing direct and transshipment exports to Article 5 countries. The data for 2003 on exports to Article 5 developing countries is the most recently compiled and analyzed. The Agency has not compiled and analyzed this same data for the years 1999 through 2002 but believes 2003 data to be an appropriate proxy for the amount of U.S. exports to Article 5 countries anticipated to be exported to Article 5 developing countries in the 2005 calendar year. Although 2003 is the most current data and therefore used in this methodology, another approach might take an average of exports to Article 5 countries over the last three years, or even five years. As shown in Table III-2, the difference between actual U.S. methyl bromide exports to developing countries in 2003 and the total amount of Article 5 allowances that will be available in 2005 is equal to an amount that would come from existing inventories equal to 1,606 metric tons.

Table III-2: Calculation of Exports to Developing Countries (in metric tons)

Total A5 exports (2003)		A5 Allowances (2005)		Amount coming from Existing Stocks
5,842	-	4,236	=	1,606

C. Exports to Developed Countries (E2)

The estimate of Exports to Developed Countries (E2) is based on the 2005 critical use exemptions approved for all non-Article 5 countries in Decision Ex. I/3, with the anticipation that **[…redacted…]**percent of the total critical use exemptions would be met by methyl bromide from U.S inventories at the beginning of 2005 because of delays and start-up difficulties either in the U.S. or in other non-Article 5 countries with regard to implementation of critical use exemption procedures (**[…redacted…]*** 12,153 = **[…redacted…]** metric tons). An amount of the inventory is included to meet critical use needs in the United States, as well as other non-Article 5 countries, because a contingency amount of inventory may be needed if regulatory and company procedures are not in place for the manufacture and transport to customers during the first weeks of 2005. It is anticipated that inventories may be needed to meet critical use needs in other countries as the implementation of critical use trade faces start-up challenges. The 11 developed countries that obtained Critical Use Exemptions for 2005 are listed in Table III-3. The total critical use exemptions approved for 2005 is 12,153 metric tons methyl bromide.

The **[…redacted…]** percent assessment is based on an estimate of the amount of initial foreign and domestic demand for critical use methyl bromide that would be met by stocks in the first several months of 2005. For this methodology, the assumption is that there may be delays for about **[…redacted…]** weeks at the beginning of 2005. The Agency believes this is a conservative estimate of implementation lag often faced in the initiation of a regulatory program, especially one that involves international trade and bi-lateral coordination. It is anticipated there will be some difficulties in initiating implementation of the newly established critical use regulations by the U.S. and the other 10 CUE authorized non-Article 5 countries. These difficulties will likely cause some short-term distortion of methyl bromide distribution, but this should not persist for more than a few months after the rules and procedures take effect. Although **[…redacted…]** percent is used in this methodology to estimate the amount of inventory to meet initial foreign and domestic demand due to start-up challenges, it is possible that the difficulties could be larger or smaller than anticipated. If the U.S. critical use exemption allocation system is in place and ready to be implemented in advance of January 1, 2005, the amount of inventory that might be needed to smooth the transition to the post-phaseout period could be less. However, if the U.S. implementing regulation for the critical use exemption process were to be delayed in its effectiveness, there could be a need for a greater amount of inventory to meet needs at the beginning of the calendar year.

Table III-3: Critical Use Exemptions Approved for
Calendar Year 2005 (in metric tons)

Country	Critical Use Exemption
Australia	145
Belgium	47
Canada	55
France	407
Greece	186
Italy	2,133
Japan	264
Portugal	50
Spain	1,059
United Kingdom	128
United States of America	7,659
TOTAL	12,153
[…redacted…]Percent Met by U.S. Inventories	**[…redacted…]**

D. Catastrophic Reserve (C)

Catastrophic Reserve (C) is defined as the amount of the methyl bromide inventory in the U.S. for both domestic and overseas markets for transformation (feedstock), quarantine and preshipment, Article 5 countries, and critical uses over a period of just over three months (i.e., the amount of methyl bromide that would be physically manufactured in the U.S. to meet all historical market demand over an approximate three-month period). For planning purposes, it is assumed that, following an unforeseen failure in U.S. methyl bromide production, there would be no active manufacturing capacity for 100 days. Catastrophic Reserve is included in the methodology because the U.S. is the world's largest supplier of methyl bromide and there are a small number of facilities in the U.S. manufacturing or capable of manufacturing methyl bromide.

Specifically, there are currently only two U.S. facilities capable of manufacturing methyl bromide. At present, the owner of one of these facilities is manufacturing methyl bromide both for its own customers and on a "toll" basis for the second company's customers. The second company's plant has process equipment capable of manufacturing methyl bromide; however, the manufacturing process is currently configured for and is manufacturing other bromine compounds. Thus, the second plant, would need to be physically reconfigured in order to manufacture methyl bromide.

In the event of unforeseen failure of the first plant, domestic methyl bromide manufacturing would be interrupted and there would be no active manufacturing capacity for methyl bromide in the U.S. This situation would persist until such time as the first company was able to repair or replace the lost methyl bromide manufacturing capacity at its plant or until the second company was able to commence methyl bromide manufacturing at its facility. It is estimated that a minimum period of just over three months (100 days) would be required for U.S. methyl bromide manufacturing capacity to be restored after a plant failure.

The 100 day estimate is based on the following information. The second company has indicated that it may take several months to reconfigure the process equipment at its facility to manufacture methyl bromide. Both the second company and the permit engineer for the state agency that regulates this facility indicated that the second company would not have to notify the state agency or obtain modifications to its Air Permit in order to reconfigure the process equipment and commence manufacturing methyl bromide. However, in order to provide a sufficient buffer in the event of any unforeseen delays in the reconfiguration of second plant's process equipment, and also to account for the anticipated capacity shortfall (i.e., the difference between the methyl bromide manufacturing capacity of the two plants), EPA has included for the Catastrophic Reserve an amount equivalent to the amount of methyl bromide manufactured in the United States for both domestic and overseas markets for transformation, quarantine and preshipment, Article 5 countries, and critical uses over a period of just over three months (100 days).[1] Because it would take several more months for the first company to reconstruct its methyl bromide plant, this capacity shortfall would likely persist for many more months.

The 100-day time frame corresponds to a Catastrophic Reserve amount of **[…redacted …]** metric tons methyl bromide. The calculation of this quantity is illustrated in Table VI-2.

Table III-4: Calculation of Catastrophic Reserve Amount based on 100-Day Capacity Replacement Timeframe (in metric tons)

Estimated Total Global Consumption to be Met by US Production in 2005 (based on historical U.S. production for all domestic and foreign uses)		**Amount of Time to be Covered by Catastrophic Reserve (percent of annual domestic production)**		**Catastrophic Reserve to come from Existing Stocks**
[…redacted…]	x	100 days (27%)	=	**[…redacted…]**

[1] Note that the physical methyl bromide manufacturing capacity of the second plant is not known, and therefore EPA has not made any numerical adjustment to the catastrophic reserve estimate to account for the difference in physical manufacturing capacity between the second plant and the first plant The permitted manufacturing capacity of the second company's plant is no greater 8,234 metric tons of methyl bromide per year; however it is not known whether the second company's plant is physically capable of manufacturing that amount of methyl bromide in the time it would take for the first plant to come back on line.

In the event that the second company is either not willing to reconfigure its process equipment to manufacture methyl bromide or experiences technical difficulties in doing so, the first company could restore its methyl bromide manufacturing capacity within an estimated period of 12 months. This time frame corresponds to a Catastrophic Reserve amount of approximately **[…redacted …]** metric tons of methyl bromide. For more details on the basis for these calculations, please see Annex A.

E. Non-CUE Sectors (N)

The Non-CUE Sectors (N) is defined as the amount of methyl bromide that may be required held for transition management in non-critical use categories for use in 2005. It is anticipated that some of these U.S. methyl bromide users did not apply for a CUE for 2005 because they intend to temporarily meet their small, limited needs for methyl bromide by accessing existing U.S. inventories of methyl bromide while they transition to alternatives. Many of these methyl bromide users may count on their existing relationships with distributors as an avenue for obtaining methyl bromide in 2005.

Except in specific circumstances, the Montreal Protocol generally does not regulate use of methyl bromide, but rather production and consumption. The Protocol Parties' interpretation of the critical use exemption in Decision IX/6 explicitly states that "production and consumption, if any, of methyl bromide for critical uses should be permitted only if [...] methyl bromide is not available in sufficient quantity and quality from existing stocks." Based on this interpretation, some end users who believed that stocks would be available to them did not apply for a critical use exemption because they planned to obtain methyl bromide from inventories while they transition to alternatives. Therefore the amount (N) set aside to meet the needs of end users that did not apply for an exemption but still are using methyl bromide during a transition to substitutes must be deducted from the available stockpile. The existence and use of inventories to ease the economic impact of a transition to alternatives is anticipated in the structure of the Montreal Protocol and has been explicitly included in the development of regulations of other ozone-depleting substances under the Clean Air Act

Because these entities did not supply use data to EPA through the critical use exemption process, EPA must rely on other sources of data for determining use under category (N). EPA relied on use data gathered from USDA's National Agricultural Statistics Services (NASS 2003) and the California Department of Pesticide Regulation (CALDPR 2003) for the most recent year of available data (i.e., 2002). NASS provided preplant methyl bromide use data by crop and state; however, post harvest data for 2002 were unavailable. CALDPR data included both preplant and post harvest methyl bromide use data by crop and commodity. In many cases, CALDPR provided more comprehensive data on sector uses than did NASS. In cases where California data differed from that reported by NASS, CALDPR data were used in place of NASS in order to calculate the U.S. totals by sector and the overall quantity of methyl bromide consumed.

Methyl bromide reported use data by sector were compared to those sectors that requested CUE for 2005. The sectors that did not apply for CUE, but reported use of methyl bromide in 2002 were identified as the Non-CUE Sectors. These sectors reportedly used 912,513 kg (roughly 913 metric tons) of methyl bromide in 2002. As indicated in Table III-5, the 2005 Non-CUE sector demand is estimated to be equal to Non-CUE sector demand in 2002. This quantity (N) represents 12 percent of the total reported methyl bromide use in all sectors by NASS and CALDPR. Annex B presents the calculation of this 913 metric ton total, broken out by sector. Although this methodology uses the value of 913 metric tons for the amount of non-CUE methyl bromide that would come from inventory based on 2002 data reported by NASS and CALDPR., it is possible that updated NASS and CALDPR data for 2003 may show a non-CUE amount that is less or more than the amount for 2002.

Table III-5: 2005 Methyl Bromide Demand by Non-CUE Sectors (N) (in metric tons)

2002 Non-CUE Demand	**=**	**2005 Non-CUE Demand**
913		913

F. Drawdown Estimate for 2004 (D)

The estimate of 2004 Drawdown is defined as the estimated change in the amount of existing stocks from the end of 2003 (December 31, 2003) to the end of 2004 (December 31, 2004). The estimate of the drawdown of inventory in 2004 is based on the calculation of the 2003 Drawdown that comes from data reported to EPA by manufacturers, importers and national distributors of methyl bromide. Companies were asked to report existing stocks of methyl bromide as of December 31, 2002 and as of December 31, 2003. Because data was not collected from regional methyl bromide distributors, the value for drawdown during 2003 may be underestimated. The assumption for this assessment is that the drawdown during the 2004 calendar year will be greater than in 2003, driven by the heightened attention on inventories at recent international meetings and the resulting domestic regulatory proposals. Thus, the 2004 Drawdown value is estimated as a range between **[…redacted…]** percent and **[…redacted…]** percent of the 2003 Drawdown value. The table below presents these calculations.

Table III-6: Calculation of Range for 2004 Methyl Bromide Drawdown (D) (in metric tons)

	2003 Drawdown		**Percent of 2003 Drawdown**		**2004 Drawdown**
Estimate 1	1,385	x	**[…redacted…]**	=	**[…redacted…]**
Estimate 2	1,385	x	**[…redacted…]**	=	**[…redacted…]**

SECTION IV. Calculation of Available Stocks (AS)

Available Stocks (AS) are calculated as follows: AS = (ES + B) - E1- E2- C- N- D. Although each of the factors in the methodology is an estimate represented by a value within a possible limited range, for the purposes of this assessment the factor of the 2004 Drawdown is given as two estimates to identify a range of values for Available Stocks.

Based on the information presented in Sections II and III, and as shown in Table IV-1, the identification of Available Stocks of methyl bromide for critical uses in 2005 is a range from a minimum of 1,238 metric tons to a maximum of 1,930 metric tons. These totals represent between approximately 5 percent and 8 percent of the U.S. consumption baseline. Based on the discussion of possible variability of other factors above, additional estimates of AS all of which are within the 5 to 8% range are represented in the table below

Table IV-1: Calculation of Available Stocks for Calendar Year 2005 (in metric tons)

	ES + B	**-**	**E1**	**-**	**E2**	**-**	**C**	**-**	**N**	**-**	**D**	**=**	**AS**
	Existing & Banked Stocks		Exports to A5 Countries		Exports to non-A5 Countries		Catastrophic Reserve		Non-CUE Sectors		Drawdown		Available Stocks
Estimate 1	**[redacted]**	**-**	1,606	**-**	**[redacted]**	**-**	**[redacted]**	**-**	913	**-**	**[redacted]**	**=**	**1,238**
Estimate 2	**[redacted]**	**-**	1,606	**-**	**[redacted]**	**-**	**[redacted]**	**-**	913	**-**	**[redacted]**	**=**	**1,930**

References

CALDPR. 2003. *California Pesticide Use Report Data Summaries: By Chemical.* 1989-2002 Reports. California Department of Pesticide Regulation. <http://www.cdpr.ca.gov/docs/pur/purmain.htm>

NASS. 2003. *Agricultural Chemical Usage: Vegetable Summary 2002*. National Agricultural Statistics Service, U.S. Department of Agriculture. July 16. <http://usda.mannlib.cornell.edu/reports/nassr/other/pcu-bb/agcv0703.txt>

U.S. EPA. 2004. *ODS Tracking System Data.* U.S. Environmental Protection Agency.

Annex A. Detailed Calculation of Catastrophic Reserve

I. BACKGROUND:

There are currently **[…redacted …]** two U.S. facilities authorized under the CAA and known to EPA to be capable of producing methyl bromide: **[…redacted …]**.

Currently, **[…redacted …]**.[2] **[…redacted …]** is producing methyl bromide both for its own customers and on a "toll" basis **[…redacted …]**. Methyl bromide is produced at as a **[…redacted …].**

The **[…redacted …]** has two permitted processes that can produce **[…redacted …]**. The **[…redacted …]** process is a proprietary process that produces **[…redacted …]** by reacting **[…redacted …]** and **[…redacted …]** as a coproduct. The **[…redacted …]** process is a **[…redacted …]** process capable of producing **[…redacted…]** methyl bromide or **[…redacted …]**. **[…redacted …]** is produced in this process by reacting **[…redacted …]**. The **[…redacted …]** process can also be used to produce other products, including sodium bromide, and **[…redacted …]**.

In the event that there is a disruption of the capability of **[…redacted…]** to produce methyl bromide, the U.S. would temporarily have no processes in operation that are capable of producing methyl bromide. Therefore, the time frame and technical and regulatory barriers to replace the lost U.S. methyl bromide capacity are assessed in this report.

In order to gather information on methyl bromide production in the U.S., discussions were held with **[…redacted …]** on May 18, 2004 and with **[…redacted …]** on May 11, 2004.

Mr. **[…redacted…]** provided information concerning methyl bromide production capability at the **[…redacted …]**.[3] Dr. **[…redacted …]** and Mr. **[…redacted …]** provided information concerning methyl bromide production at the **[…redacted …]**[4], and also agreed to provide written responses to questions posed to them concerning the **[…redacted …]** methyl bromide process and concerning the time frame for **[…redacted …]** to replace lost methyl bromide production capacity. Such information will be incorporated into a revised version of this report upon receipt. Therefore, estimates that follow concerning the time frame needed for **[…redacted …]** to replace lost methyl bromide capacity should be considered preliminary.

II. SUMMARY OF PRINCIPAL FINDINGS:

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[2] Toll processing is where one company, for a fee, manufactures a product on behalf of another company for that company to distribute to its customers.

[3] Mr. Tom Land of EPA and Mr. Robert Lanza of ICF Consulting spoke with Mr. **[…redacted …]**, May 18, 2004 at 3:30 PM.

[4] Mr. Tom Land of EPA and Mr. Robert Lanza of ICF Consulting met with Dr. **[…redacted …]** and Mr. **[…redacted …]**, May 11 2004 at 10:00 AM.

This section provides a summary of the following:

- current U.S. methyl bromide production capacity;
- the time frame for **[…redacted …]** to replace lost methyl bromide production capacity;
- the time frame for **[…redacted …]** to replace lost methyl bromide production capacity;
- the economic, regulatory, and technical barriers to restoring U.S. production capacity; and
- **[…redacted…]** potential access to foreign methyl bromide production capacity.

A more detailed discussion of these issues is provided in Section III.

A. Current U.S. Methyl Bromide Production Capacity

The amount of methyl bromide consumed in the U.S. in 2003 is presented in Table 1. U.S. production is broken out by the quantities credited to **[…redacted …]**. The **[…redacted …]** currently has an estimated surplus methyl bromide production capacity of at least **[…redacted …]**metric tons per year.

Table A-1: U.S. Methyl Bromide Consumption in 2003

	Amount (metric tons)
Total Production	**[…redacted …]**
Albemarle[a]	**[…redacted …]**
GLCC	**[…redacted …]**
Total Allowable Consumption	**7,658**
Total Actual Consumption	**6,507**

Note: The difference between total production and actual consumption was the amount exported.
[a]**[…redacted …]**
Source: EPA Tracking System 2004.

B. Time Frame for […redacted…] to Replace Lost U.S. Methyl Bromide Production Capacity

- According to **[…redacted …]**, the **[…redacted …]** plant could be converted to produce methyl bromide within **[…redacted …]** weeks.

- The estimated methyl bromide production capacity of the **[…redacted …]** is no greater than **[…redacted …]** metric tons per year. Therefore, if the **[…redacted …]** process became the only U.S. process producing methyl bromide, there would be a production capacity shortfall.

C. Time Frame for […redacted …]to Replace Lost Methyl Bromide Production Capacity

- If both the **[…redacted …]** production process and the physical site location upon which the production process is situated became permanently unusable, it is estimated that permitting and constructing replacement methyl bromide production capacity at another **[…redacted …]** facility location **[…redacted …]** would require approximately **[…redacted …]** months.

- If the **[…redacted …]** methyl bromide process became unusable but the physical site at the **[…redacted …]** upon which the process is situated remained in a useable condition, it was estimated that constructing replacement methyl bromide production capacity at the **[…redacted…]** would require approximately **[…redacted …]** months.

D. Economic, Regulatory, and Technical Barriers to Providing Replacement Capacity

- There are significant economic, regulatory, and technical barriers to entities other than **[…redacted CBI…]** developing replacement U.S. methyl bromide production capacity.

- Economic: EPA believes that it is unlikely that an entity other than **[…redacted …]** would commit the capital investment needed to build a new methyl bromide plant, considering that, under the anticipated time frame of the Montreal Protocol the plant would only be permitted to operate for several more years.

- Regulatory: A new methyl bromide plant would be regulated as a hazardous air emissions source and would therefore be required to obtain environmental permits from the state regulatory agency. Obtaining permits for a new plant would be more difficult and time-consuming than modifying existing permits for an existing **[…redacted …]** facility.[5]

- Technical: Entities other than **[…redacted …]** would not necessarily have either the process information or bromine raw material production capacity to facilitate development of replacement methyl bromide production capacity.

E. Domestic Producers' Access to Foreign Methyl Bromide Production Capacity

Both **[…redacted …]** appear to have access to foreign-based methyl bromide production capacity that could allow them to at least partially replace lost U.S. production capacity. The methyl bromide production capacity outside the United States includes the following:

- **[…redacted …]**.

- **[…redacted …]**

[5] There do not appear to be any provisions of the Clean Air Act that would allow the Federal Government to exempt a private sector entity from state hazardous air emissions source permitting requirements.

III. DISCUSSION OF FINDINGS:

A more detailed discussion of the technical, regulatory, and economic issues associated with replacement of lost methyl bromide production capacity follows.

A. Current Methyl Bromide Production Capacity

The EPA Tracking System indicates that **[…redacted …]** produced **[…redacted …]** metric tons of methyl bromide in 2002 and **[…redacted …]** metric tons of methyl bromide in 2003. **[…redacted…]** started up their new **[…redacted …]** process at **[…redacted …]**, and subsequently took their **[…redacted …]**.[6] **[…redacted …]** was credited in the EPA Tracking System for **[…redacted …]** of methyl bromide **[…redacted…]** in 2002 and 2003, and is **[…redacted …]**. Mr. **[…redacted …]** indicated that the **[…redacted …]** is permitted to produce either **[…redacted …]** percent or **[…redacted …]** percent of baseline methyl bromide production capacity.[7] One hundred percent of baseline capacity is **[…redacted …]** metric tons, and **[…redacted …]** percent of baseline capacity is **[…redacted …]** metric tons.[8]

The EPA Tracking System indicates that **[…redacted …]** produced **[…redacted …]** metric tons of methyl bromide production in 2000 and **[…redacted …]** metric tons of methyl bromide production in 2003 **[…redacted …]**. This corresponds to a difference of **[…redacted …]** metric tons. It appears from the **[…redacted …]** that there have not been any physical changes to the methyl bromide process between 2000 and 2003. If this is the case, it would appear that the **[…redacted …]** methyl bromide production capacity of **[…redacted …]** metric tons per year.

B. […redacted…] Methyl Bromide Production Process

Mr. **[…redacted…]** indicated that **[…redacted…]** maintains **[…redacted …]**. **[…redacted …]** indicates that **[…redacted …]** is permitted to operate their **[…redacted …]** in an "alternate operating scenario" where **[…redacted …]** "process area may be used to produce methyl bromide as its primary product."[9] The **[…redacted …]** process is now permitted to manufacture other bromine derivatives, including sodium bromide. **[…redacted …]**].[10]

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6 **[redacted…]**

7 To be confirmed.

8 Note that the EPA Tracking System reported that in 2000 **[…redacted …]** produced at total of **[…redacted …]** metric tons of methyl bromide, including a **[…redacted …]** metric tons. ICF is investigating the source of the **[…redacted …]** and whether the total **[…redacted …]**metric tons was produced at the **[…redacted …]**, and if so how this amount was produced considering that 1991 baseline capacity for **[…redacted …]** metric tons.

9 Arkansas Department of Environmental Quality (ADEQ) Operating Air Permit **[…redacted…]** dated February 18, 2003.

10 **[…redacted…]**.

The Operating Air Permit indicates that "when the methyl bromide primary product scenario is operating, the TBBPA process will be at rest (only one [production process] may physically occur at any given time.)" [Mr. **[…redacted …]** indicated that **[…redacted …]**

According to Mr. **[…redacted …]**. The EPA Tracking System reported for 2003 that **[…redacted…]** produced approximately **[…redacted …]** metric tons of methyl bromide [for itself and **[…redacted …]**metric tons **[…redacted …]** for a total of **[…redacted …]**metric tons. If **[…redacted …]**, there would be a production capacity shortfall, even if **[…redacted…]**.

A second option would be for **[…redacted …]** to produce methyl bromide. **[…redacted …]** to produce methyl bromide **[…redacted…]**, and Mr. **[…redacted …]** not currently permitted to produce methyl bromide. Therefore, **[…redacted …]** rather than to modify the **[…redacted …]** to produce methyl bromide.

C. […redacted …] Methyl Bromide Production Process

Although **[…redacted …]** they could choose not to do so or could experience technical difficulties. Mr. **[…redacted …]** gave no indication that either of these situations would arise, but even if **[…redacted …]** choose to convert the **[…redacted …]**, there could be a capacity shortfall **[…redacted …]**. Therefore, **[…redacted …].**

Dr. **[…redacted …]** and Mr. **[…redacted…]** indicated during their meeting with EPA and ICF that there is **[…redacted…]**. This **[…redacted …]** produces methyl bromide by reacting **[…redacted …]**. The methyl bromide separation process is complex because the boiling point of methyl bromide is very low, necessitating a refrigerated separation process.

[…redacted …] indicated that loss of the methyl bromide reactor could be “engineered around,” possibly by employing other existing chemical reactors at **[…redacted …]**, but that loss of the methyl bromide distillation/refrigeration unit could not be “engineered around.” The distillation/ refrigeration unit would need to be repaired/replaced to restore methyl bromide production and separation capacity. **[…redacted …].** However, even if one of the reactors was dedicated to methyl bromide production, the methyl bromide distillation/refrigeration system would still be needed to conduct the product separation. **[…redacted …]** Dr. **[…redacted …]** and Mr. **[…redacted …]** indicated that replacement of the methyl bromide distillation/refrigeration unit at the **[…redacted …]** would probably require **[…redacted …]**.   Dr. **[…redacted …]** and Mr. **[…redacted …]** indicated that **[…redacted …]** may be able to provide additional written information to EPA concerning the replacement time frame for the **[…redacted …]** distillation/refrigeration unit.

[…redacted …] indicated that **[…redacted …]** could be assigned to producing methyl bromide (this would involve shutting down some other chemical production process at the plant), **[…redacted …]**. A refrigeration/distillation unit would have to be built **[…redacted …].**

In order to determine the time frame for **[…redacted …]** to replace their own methyl bromide production capacity, two different situations were analyzed.

The first situation assumes that both the **[…redacted …]** methyl bromide **[…redacted …]** process and the physical site location upon which the production process is situated become permanently unusable. In this case, it was estimated that constructing replacement methyl bromide production capacity at another **[…redacted …]** location (presumably **[…redacted …]**) would require approximately **[…redacted …]** months. This time frame includes:

- **[…redacted …]** months to design the plant and prepare environmental permit application;
- **[…redacted …]** months to obtain the required Operating Air Permit modifications; and
- **[…redacted …]** months to construct and start up the plant.

For this scenario, **[…redacted …]** is assumed to be unable to utilize the existing **[…redacted …]** site and its associated infrastructure to support reconstruction of the methyl bromide process, and would therefore have to construct the replacement methyl bromide process at another **[…redacted …]** facility location. Under normal circumstances the three above-listed activities would be conducted consecutively. If the proposed new methyl bromide process is exempted from environmental permitting requirements (see below) the second activity could be eliminated.

The second situation assumes that the **[…redacted…]** methyl bromide process became unusable but the physical site at the **[…redacted …]** upon which the process is situated remained in a useable condition. In this case, it was estimated that constructing replacement methyl bromide production capacity would require approximately **[…redacted …]** months, rather than **[…redacted …]** months. Under this assumption **[…redacted …]** is assumed to rebuild the methyl bromide process at the same physical site location at the **[…redacted …]**, utilizing the existing [and usable] **[…redacted …]** infrastructure. Ordinarily, no modifications to the **[…redacted …]** would be required for **[…redacted …]** to replace unusable process equipment with identical usable process equipment.

D. Economic, Regulatory, and Technical Barriers to Providing Replacement Capacity

It is anticipated that economic, regulatory, and technical barriers would preclude entities other than **[…redacted …]** from replacing lost methyl bromide production capacity.

1. Economic Issues

It is unlikely that an entity other than **[…redacted …]** would commit the capital investment needed to build a new methyl bromide plant that, under the anticipated time frame of the Montreal Protocol, would only be permitted to operate for several more years. Therefore, it is anticipated that the only viable options for replacing lost U.S. production capacity are:

- converting the **[…redacted …]** to produce methyl bromide.
- replacing the lost methyl bromide process equipment at **[…redacted …]**; or
- installing new methyl bromide process equipment at the**[…redacted …]**.

Considering the regulatory and business climate around methyl bromide, it is unclear whether economic incentives would be required for **[…redacted …]** to decide to build a new methyl bromide production facility **[…redacted …]**, or, in the case of **[…redacted …]**, to decide to **[…redacted…]**. It was assumed that if the methyl bromide process equipment at **[…redacted …]** became unusable, **[…redacted …]** would choose to replace unusable process equipment if they were capable of doing so and if the **[…redacted …]** was still usable. However, in the event that reconstruction of the methyl bromide process at **[…redacted …]** was not possible, there would be significant economic barriers to construction of a new methyl bromide production process at another location.

ICF is currently researching the estimated capital cost of constructing a new methyl bromide production facility. It appears that the cost could potentially be in the tens of millions of dollars.[11] It is unclear whether a private sector entity, even **[…redacted …]**, would choose to make such a capital investment in a new methyl bromide plant to replace lost production capacity. If methyl bromide production is phased out within the anticipated time frame under the Montreal Protocol, this time frame may not provide a sufficient amount of time for **[…redacted …]** to recover an adequate return on their capital investment in a new methyl bromide production plant.

Similarly, **[…redacted …]** even if the lost methyl bromide production capacity results in increases in the price of methyl bromide. **[…redacted …]**. Nevertheless, EPA may want to investigate the extent to which the Federal Government could (a) compel a private sector entity to produce a commercial product (i.e., methyl bromide) at an existing facility or compel a private sector entity to construct a new plant to produce such a product or (b) provide economic incentives to a private sector entity either to produce a commercial product at an existing facility or to construct a new plant to produce such a product.

<u>2. Regulatory/Environmental Permitting Issues</u>

[11] According to the U.S. Geological Survey, the $150 million JBC bromine complex includes a 50,000-tpy bromine plant, 40,000-tpy calcium bromide plant, and 12,500 tpy initial capacity TBBPA plant expandable to 37,500 tpy. [see footnote 16]. *Fertilizer International* 2000 and *WWP-Business Opportunities in Africa & the Middle East* 1999 both suggest that the construction cost for the JBC bromine complex was on the order of $120 million.

Also, a new methyl bromide plant would be regulated as a hazardous air emissions source and would therefore be required to obtain environmental permits from the state regulatory agency. The new source permitting process is more complex and time consuming than is obtaining a modification of an existing facility Operating Air Permit, and it could take more than a year to design the plant, prepare the permit application and obtain the required construction permits, and then another year to construct the plant.[12] If the proposed new methyl bromide process is exempted from environmental permitting requirements, the time frame could be shortened by approximately six months.

There are also several issues related to environmental permitting that could affect the time frame needed for **[…redacted …]** to replace lost U.S. production capacity.

a. Status of **[…redacted …]** *Plant Permit*

Ordinarily, no modifications to permits would be required for **[…redacted …]** to replace unusable equipment with identical usable equipment at an existing production facility. However, the Title V Permit for the **[…redacted …]** s still in draft form and is not final because the ADEQ has outstanding regulatory issues concerning the methyl bromide emissions from the **[…redacted …]**. Both major and minor sources of hazardous air pollutants (HAPs, including methyl bromide) in Arkansas are subject to a screening analysis, based on the hourly emission rate of each HAP. Each HAP is subject to an air quality dispersion analysis, for which the screening threshold ambient air concentration is 1/100th of the Threshold Limit Value (TLV) for the HAP. In the case of the **[…redacted …]**, the screening analysis indicated that the methyl bromide emissions exceeded the screening level for methyl bromide, and under ADEQ HAP regulations, **[…redacted …]** s required to conduct a risk assessment for the **[…redacted …]** methyl bromide emissions. Mr. Crouch indicated that **[…redacted…]** does not want to conduct the risk assessment, and there are regulatory and agency policy issues involved in getting **[…redacted …]** to conduct the risk assessment. It is conceivable, however, that in the event **[…redacted…]** had to replace unusable equipment at **[…redacted …]** or install replacement equipment at **[…redacted …]**, that ADEQ may decide to revisit the outstanding regulatory issues and compel **[…redacted …]** to complete the risk assessment for the **[…redacted …]**. This could affect the time frame for constructing replacement capacity at either the **[…redacted …]**. [13]

[12] Physical construction of the new **[…redacted …]**

[13] Mr. Robert Lanza of ICF Consulting spoke with Mr. Wesley Crouch, ADEQ Permit Engineer for **[…redacted …]**, 501-682-0744, May 10, 2004 at 11:30 AM.

b. Time Frame for New Source Permitting

Under Arkansas Statute the ADEQ is required upon receipt of a permit application to issue a permit within six months unless the ADEQ finds that additional information is required from the applicant to enable the Agency to issue the permit. Each such information request "resets" the six-month clock, so the amount of time required for an applicant to obtain a permit depends upon how comprehensive the permit application is.[14]

c. Potential for Expediting the Environmental Permitting Process

It is unclear to what extent the estimated **[…redacted…]** time frame to initiate production at a new methyl bromide plant could be expedited. There do not appear to be any provisions of the Clean Air Act that would allow the EPA Administrator to exempt a private sector manufacturing facility from requirements to obtain state air emissions permits. There are, however, provisions under Section 118 of the Clean Air Act for Presidential exemption of Federal government facilities from provisions of the Act.[15] The Federal Government could theoretically construct a government-owned contractor-operated methyl bromide plant. EPA may want to investigate the extent to which a new methyl bromide facility could be exempted from state permit requirements and the extent to which environmental permitting could be expedited in the event of a disruption of U.S. methyl bromide production capacity.

3. Technical Issues

Both **[…redacted …]** have available proprietary process engineering information that they could use to design a new methyl bromide plant, and have existing bromine production capacity; bromine being the basic raw material needed to produce methyl bromide. Other entities would not necessarily have either the process information or bromine production capacity however, there are natural bromine reserves in Michigan as well as in Arkansas. These would both represent significant barriers to entry of other entities into methyl bromide production.

E. Foreign-based Methyl Bromide Production Capacity

[…redacted …] replace lost U.S. production capacity.

[…redacted …]

[14] Mr. Robert Lanza of ICF Consulting spoke with Mr. Wesley Crouch, ADEQ Permit Engineer for **[…redacted …]** Central Plant, 501-682-0744, May 10, 2004 at 11:30 AM.

[15] 42 USC §7418(b) (§118(b)).

Annex B. Non-CUE Sectors and Reported Methyl Bromide Use

Table B-1: Non-CUE Sectors and Reported Methyl Bromide Use

Sectors That Did Not Request CUE	2002 U.S. Reported Use from NASS & CADPR (kg)
Preplant Uses	
Tomatoes	
OH and TN Tomatoes	149,804
OH Tomatoes	IE
TN Tomatoes	IE
Strawberries	
OR Strawberries	0
Peppers	
OH Peppers	0
Cucurbits	
CA Cucumbers	25
AZ Watermelons	7,881
TX Watermelons	7,881
CA Watermelons	32,439
CA Cantaloupe	5,455
CA Squash	4,082
NJ Squash	4,082
Eggplant	
CA Eggplant	1,710
Ginger	
CA Ginger	0
Cabbage	
CA, FL, GA, NY, OH, PA, TX and WI Cabbage	2,585
CA Cabbage	IE
FL Cabbage	IE
GA Cabbage	IE
NY Cabbage	IE
OH Cabbage	IE
PA Cabbage	IE
TX Cabbage	IE
WI Cabbage	IE
NC Cabbage	680
Other CA Crops	
CA Broccoli	1,219
CA Cotton	22
CA Beans, Dried and Unspecified	228
CA Blackberries and Blueberries	2,411
CA Celery	6,735
CA Christmas tree plantations	240
CA Chives	2,405
CA Dates	556
CA Dill	509
CA Figs	6,348
CA Wine Grapes	50,089
CA Greenhouses (empty)	4
CA Herb, Spice	1,779
CA n-grnhs grown plants in containers	3,473
CA n-grnhs grown transplant/prpgtv mtrl	2,257
CA n-outdoor container/fld grwn plants	67,954

Sectors That Did Not Request CUE	2002 U.S. Reported Use from NASS & CADPR (kg)
CA n-outdoor grwn transplant/prpgtv mtrl	124,310
CA Lettuce	23,422
CA Onions	1,030
CA Peppers, chili type, flavoring and spice	0
CA Quince	11
CA Rice	11
CA Sage	27
CA Small Fruits	30
CA Spinach	0
CA Tarragon	58
CA vegetables (all or unspecified)	1,115
CA Vegetables, Fruiting	1,662
CA Vegetables, Leafy	2,410
CA Vetch	49
CA Yam	17
CA Other	
CA Regulatory pest control	4,378
CA soil application, preplant-outdoor (seedbeds, etc.)	228,599
CA uncultivated agricultural areas	15,763
CA uncultivated non- agricultural areas	2,732
CA Vertebrate Control	202
CA Unknown	718
PRE-PLANT TOTAL	**769,398**
Post Harvest Uses	
Commodities	
CA Almonds	2,398
CA Cashews	0
CA Nut crops, nut trees	11
CA Apricots	9
CA Bananas	11
CA Cherries	5,691
CA Grapes	18,557
CA Nectarines	1,077
CA Peaches	1,541
CA Pineapple	39
CA Plums	428
CA Other	
Airports and Landing Fields	1
Fumigation, other	91,673
Landscape Maintenance	8,556
Regulatory Pest Control	3,655
Research Commodity	242
Rights of Way	118
Structural Pest Control	9,103
Uncultivated Agricultural Areas	3
POST HARVEST TOTAL	**143,115**
TOTAL	**912,513**

Note: NA = Not applicable. IE = Included elsewhere.